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Covering the Period 1 October 1988 to 30 September 1989

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A PROTOTYPE ANALYSIS SYSTEM FOR SPECIAL REMOTE VIEWING TASKS

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ABSTRACT

We have developed a prototype analysis system for remote viewings conducted against targets of interest. The system uses individual viewers' performance histories in conjunction with current data to prioritize a set of possible interpretations of the site.

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(U) LIST OF TABLES

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I INTRODUCTION

Since 1973, when the investigations of the human information-accessing capability called remote viewing (RV) first began at SRI International,[1*] evaluating the quality of the information obtained has been a continuing challenge. In order to develop valid evaluation procedures, two basic questions must be addressed:

(1) What constitutes the target?

(2) What constitutes the response?

If the RV task is research-oriented, the targets are known, and therefore can be precisely defined. In -oriented tasks, however, the targets are generally unknown and their descriptions are problematical. In both task domains, RV responses tend to consist of sketches and written phrases. A method to encode unambiguously this type of "natural language" is one of the unsolved problems in computer science, and there has been little progress to date. Thus, a complete definition of an RV response is also problematical.

An -oriented RV task poses further problems. High-quality RV does not always provide useful . For example, the RV may provide additional support for information that has been verified from other sources, but provide no new information. In some cases, however, an overall low-quality RV may provide key elements that positively influence an analyst's interpretation.

Another characteristic of current laboratory analysis techniques is that they do not provide an a priori assessment of the RV quality. While this is not a problem in the laboratory, applications require such evaluation. An RV analyst cannot provide usefulness ratings from the RV alone; rather, the analyst must provide a priori probabilities that individual RV-response elements (or concepts) are present at the target site. It remains the responsibility of analyst to determine whether such data are ultimately useful.

Analysis of laboratory RV has been a major part of the ongoing Cognitive Sciences Program.[2-7] For FY 1989, we focused on the development of a prototype analysis system that would provide the needed a priori assessments for tasking.†

* References are at the end of this report.

† This report constitutes the deliverable for Statement of Work item 6.0.3.

The intelligence analyst, as opposed to an RV analyst, should construct such a list for each mission. While there may be considerable similarities between element lists for different missions, undoubtedly the lists will require specialization. In Section II–C below, we show the construction of one element list and how it can be applied to a set of 65 simulated operational targets.

2. Analysis of Complete Responses

Once an appropriate universal set of elements has been created, and fuzzy sets that define the target and the response have been specified, the comparison between them is straightforward. We have defined *accuracy* as the percent of the target material that is described correctly by a response. Likewise, we have defined *reliability* (of the viewer) as the percent of the response that is correct.[6] Although in the laboratory it is required to provide a posterior probability estimates of the target–response match, in an operational setting, this may be less important. All that is usually necessary is to describe the accuracy and reliability for complete responses, and for individual target elements of interest. These quantities for the *j*th sessions are

$$r_j = \frac{\sum_{k=1}^{n} W_k (R_j \bigcap T_j)_k}{\sum_{k=1}^{n} W_k R_{j,k}}, \tag{1}$$

and

$$a_j = \frac{\sum_{k=1}^{n} W_k (R_j \bigcap T_j)_k}{\sum_{k=1}^{n} W_k T_{j,k}}, \tag{2}$$

where the sum over k is called the sigma count in fuzzy set terminology, and is defined as the sum of the membership values (μ) for the elements of the response, the target, or their intersection, and n is the number of possible elements as defined by the element list. A fuzzy intersection is defined as the minimum of the intersecting fuzzy set membership values. In this version of the definitions, we have allowed for the possibility of weighting the membership values, W_k, to provide mission–defined relevances.

For the above calculation to be meaningful, the membership values for the targets must be similar in kind to those for the responses. For most mission–dependent specifications, this is generally not the case. The target membership values represent the degree to which a particular element is characteristic of the target, and the response membership values represent the degree to which the analyst is convinced that the given element is represented in the response.

Until RV abilities can encompass the recognition of elements as well as their degree of target characterization, we are required to modify the target fuzzy set. An analyst must decide upon a threshold above which an element is considered to be completely characteristic of the target site. In fuzzy set theory, this is called an α–cut: a technique to apply a threshold to the μ values such that if the original value exceeds it, reassign the value to 1, otherwise set it to 0. In this way, the analyst's subjectivity can be encoded in the response fuzzy set, and Equations 1 and 2 remain valid.

3. **Analysis of an Individual Element**

Equations 1 and 2 can be simplified to provide an accuracy and reliability on an individual element basis instead for a complete response. For example, let N be the number of sessions against different targets that exist in a current archive for a specified viewer. Let ϵ be an element in question (e.g., airport). Then the empirical probability that element ϵ is in the target, given that the viewer said it was, is given by

$$R(\epsilon) = \frac{N_c}{N_r}, \tag{3}$$

where N_c is the number of times that the individual was correct, and N_r is the number of times that element ϵ was mentioned in the response. $R(\epsilon)$ is also the reliability of the viewer for that specified element.

To compute what chance guessing would be, we must know the occurrence rate of element ϵ in the N sessions. Let N_0 be the actual number of times element ϵ was contained in the N targets. Then the chance–guessing empirical probability is given by

$$R_0(\epsilon) = \frac{N_0}{N}.$$

$R_0(\epsilon)$ can also be considered as the guessing reliability (i.e., the reliability that would be observed if the viewer guessed ϵ during every session). The more $R(\epsilon) > R_0(\epsilon)$, the more reliable the individual is for the specified element.

The empirical probability that the viewer said element ϵ, given that it was in the target, is given by

$$A(\epsilon) = \frac{N_c}{N_0}.$$

$A(\epsilon)$ is also the accuracy of the viewer for that specified element.

As a numerical example, suppose a single viewer participated in N = 25 sessions. Let ϵ = "airport." Further suppose that N_0 = 5 of the targets actually contained an airport.

Then, $R_0(airport)$ = 0.20 is the chance probability (i.e., guessing airport during every session would only by 20 percent reliable). Assume that the viewer mentioned airport N_r = 6 times and was correct N_c = 4 times. Then this viewer's reliability for airports is computed as $R(airport)$ = 0.67 > $R_0(airport)$ = 0.20. The viewer's accuracy for airports is computed as $A(airport) = N_c/N_0$ = 0.80. Thus in this example, we can conclude that this viewer is reasonably accomplished at remote viewing an airport.

B. Prototype Analysis System

We assume that an analyst has constructed a mission–dependent universal set of elements. We further assume that there are a number of competing interpretations of the target site in question.

1. Target Templates

The first step in our prototype analysis system is to define templates (i.e., general descriptions of classes of target types) of all competing target interpretations from the universal set of elements. For example, a class of target types could be a generic biological warfare (BW) facility. Exactly what the templates should represent is entirely dependent upon what kind of information is sought. Both the underlying universal set of elements and the templates must be constructed to be rich enough to allow for the encoding of all the information of intelligence interest. That is, if neither the set of elements nor the templates can meaningfully represent information about, say BW development sites, then it will be unreasonable to consider asking, "Does development of BW agents take place at the site?" Furthermore, a certain amount of atomization is necessary because such division into small units provides the potential for interactions within the universal set of elements. If the profile of a BW facility consists of a single element, the template would be useless unless the response directly stated that particular element; rather, the profile should be constructed from groups of elemental features (e.g., biological, offensive, weapon, decontamination).

There are two different ways to generate target templates. The most straightforward technique is also likely to be the most unreliable, because it relies on the analyst's judgment of a single target type. With this method, the analyst, who is familiar with the problem at hand, simply generates membership values for elements from the universal set of elements based upon his or her general knowledge. Given the time and resources, the best way to generate template membership values is to encode known targets that are closely related (e.g, a number of known BW sites). Each template μ is the average value across targets, and thus is more reliable. If it is known that some targets are more

"characteristic" of the target type than others, then a weighted average should be computed. In symbols,

$$\mu_j^T = \frac{\sum_{k=1}^{v} \omega_k u_{j,k}}{\sum_{k=1}^{v} \omega_k}, \tag{4}$$

where the sums are over the available targets that constitute the template, ω_k are the target weights, and the $\mu_{j,k}$ are the assigned membership values for target k.

2. Archival Database

A critical feature of an analysis system for RV data is that along with the current RV data to be evaluated, the individual viewer's *past* performance on an element-by-element basis must also be included. For example, if a viewer has been relatively unsuccessful at recognizing BW facilities, then a BW reference in the current data should not contribute much in the overall analysis.

As ground truth becomes available for each session, a performance database should be updated for each viewer to reflect the new information This database should be a fuzzy set whose membership values for each element are the reliabilities computed from Equation 3.

3. Optimized Probability List

The goal of any RV analysis system is to provide an a priori prioritized and weighted list of target possibilities that results from a single remote viewing that is sensitive to the performance history of the viewer. Assuming that a template exists for each of the possible interpretations, an analyst should adhere to the following protocol:

(1) Analyze the RV data by assigning a membership value (μ) for each element in the universal set of elements. Each μ represents the degree to which the analyst is convinced that the particular element is included in the response. For example, suppose that the viewer said, "I perceive a BW facility." Then $\mu(BW\ facility) = 1$. Alternatively, suppose the viewer said, "I perceive glassware and smell organic chemicals." In this case, $\mu(BW\ facility)$ might be assigned 0.6.

(2) Construct a crisp set, R_c, as an α-cut of the original response set. By adopting a threshold of 0.5, for example, then the resulting crisp set contains only those elements that the analyst deems most likely as being present in the response.

(3) Construct an effective response set, R_e, as $R_e = R_c \cap R_a$, where R_a is the reliability set drawn from the archival database. For example, suppose the original

assignment from the raw RV data was $\mu(BW\ facility) = 0.6$. Then after the α-cut with a threshold set at 0.5, $\mu(BW\ facility) = 1.0$. Suppose, however, that the viewer has been performing well on BW facilities and the archival database shows that $R_a(BW\ facility) = 0.8$. Thus, $R_e(BW\ facility) = 0.8$.

(4) Using this effective response set, compute an accuracy and reliability in accordance with Equations 1 and 2. Then compute a figure-of-merit, M_j, for the jth competing interpretations as

$$M_j = a_j \times r_j \ .$$

Of course, the accuracy and reliability use the effective response set from step 3 above.

(5) Order the Ms from largest to smallest value. Since the figures-of-merit range in value from 0 to 1, they can be interpreted as *relative* probability values for each of the alternative target possibilities.

By following such a protocol, an analyst can produce a list of target alternatives that is sensitive to the current remote viewing yet takes into consideration to the individual viewer's archival record.

C. Partial Application of Analysis System to Existing Target Pool

We have used an existing target pool (developed under a separate program) as a test bed for the analysis system described above.

1. Criteria for Inclusion in the Target Pool

Targets in this pool have the following characteristics:

- Each target is within an hour and a half automobile drive of SRI International.
- Each target simulates an operational site of interest.
- Each target fits generally within one of five functional categories: Production, Recreation, Scientific, Storage, and Transportation.
- Each target meets a consensus agreement of experienced RV monitors and analysts about inclusion in the pool.

The pool consists of 65 targets. Initially, they were divided into 13 groups of five targets each, where each group contained one target from each of five functional categories. By carefully organizing the targets in this way, the maximum possible functional difference of the targets within each group was ensured. Table 1 shows a numerical listing of these targets.

Table 1

Numerical Listing of Targets

1. Transformer Station	23. Space Capsule	45. Pump Station
2. Ballpark	24. Coastal Battery	46. Ice Plant
3. Satellite Dish	25. Bay Area Rapid Transit	47. Caves/Cliffs
4. Weapons Storage	26. Salt Refinery	48. Bevatron
5. Naval Fleet	27. Candlestick Park	49. Barn
6. Gravel Quarry	28. Solar Observatory	50. Golden Gate Bridge
7. Swimming Pool	29. Food Terminal	51. Modern Windmills
8. Observatory	30. Pedestrian Overpass	52. Baylands Nature Preserve
9. Prison	31. Electrical Plant	53. Gas Plant
10. Shipping and Receiving	32. White Plaza	54. Auto Wreckers
11. Greenhouse	33. Space Shuttle	55. Fishing Fleet
12. Picnic Area	34. Coastal Battery	56. Radio Towers
13. Satellite Dishes	35. Train Terminal	57. Vineyard
14. Paint Warehouse	36. Sawmill	58. Pharmaceutical Laboratory
15. Naval Air Station	37. Pond	59. Toxic Waste Storage
16. Sugar Refinery	38. Wind Tunnel	60. Airport
17. Playground	39. Grain Terminal	61. Car Wash
18. Aquarium	40. Submarine	62. Old Windmill
19. Drum Yard	41. Cogeneration Plant	63. Nuclear Accelerator
20. Aircraft	42. Park	64. Reservoir
21. Sewage Treatment Plant	43. Linear Accelerator	65. Train Station
22. Hoover Tower	44. Dump	

2. Fuzzy Set Element List

In FY 1989, we developed a prototype analysis system for analyzing targets and responses in operational remote viewings. A list of elements, based on target function (i.e., the mission specification), is arranged in levels from relatively abstract (information poor) to the relatively complex (information rich). Having levels of elements is advantageous in that each can be weighted separately in the analysis.

This universal set of elements (included as Appendix A) represents primary elements in the existing target pool of 65 targets. The set was derived exclusively from this known target pool. In an actual RV session, however, a viewer does not have access to the element list, and thus is not constrained to respond within its confines. An accurate RV analysis must include any additional data that may be provided in the response; therefore, additional space has been provided on the analysis sheets (see Appendix A) to include elements that are part of the response but not initially included as part of the universal set.

The target-dependent elements emphasize the site's function, and use terms that are potentially universal across targets. We identified six element levels ranging from relatively information rich to relatively information poor: affiliation, function, attributes, modifiers, objects, and general/abstract. Because operational RV presupposes a certain level of ability on the part of the viewer, there are relatively few general/abstract elements included in our prototype analysis system. A description of some of the elements shown in Appendix A and a guide to their use are presented in Appendix B.

3. Target Similarities

In order to generate a demonstration target-type template using Equation 4, we first organized the 65 targets into clusters of similar types.

We begin by defining the similarity between target j and target k ($S_{j,k}$) to be a normalized fuzzy set intersection between the two target sets;

$$S_{j,k} = \frac{\left(\sum_{i=1}^{N} W_i (T_j \cap T_k)_i\right)^2}{\left(\sum_{i=1}^{N} W_i T_{j,i}\right) \times \left(\sum_{i=1}^{N} W_j T_{k,i}\right)} . \tag{5}$$

By inspection, we see that $S_{j,k}$ is also the figure-of-merit between target j and target k.

For N targets there are $N(N-1)/2$ unique values (2080 for N=65) of $S_{j,k}$. The value j and k that correspond to the largest value of $S_{j,k}$ represent the two targets that are most functionally similar. Suppose another target m is chosen and $S_{m,j}$ and $S_{m,k}$ are computed. If both of these values are larger than $S_{m,p}$ (for all p not equal to j or k) then target m is assessed to be most similar to the pair j,k. The process of grouping targets based on these similarities is called *cluster analysis*.

Figure 1 shows the six clusters found from the cluster analysis of the 65 targets.* The numbers shown refer to the targets listed in Table 1, and the clusters are in close agreement with the original five categories used to select the targets. The point, however, is that a numerical algorithm is capable of dividing a set of targets into functional categories.

* In order to make the graphic output more meaningful, we used $1 - S_{j,k}$ in the analysis.

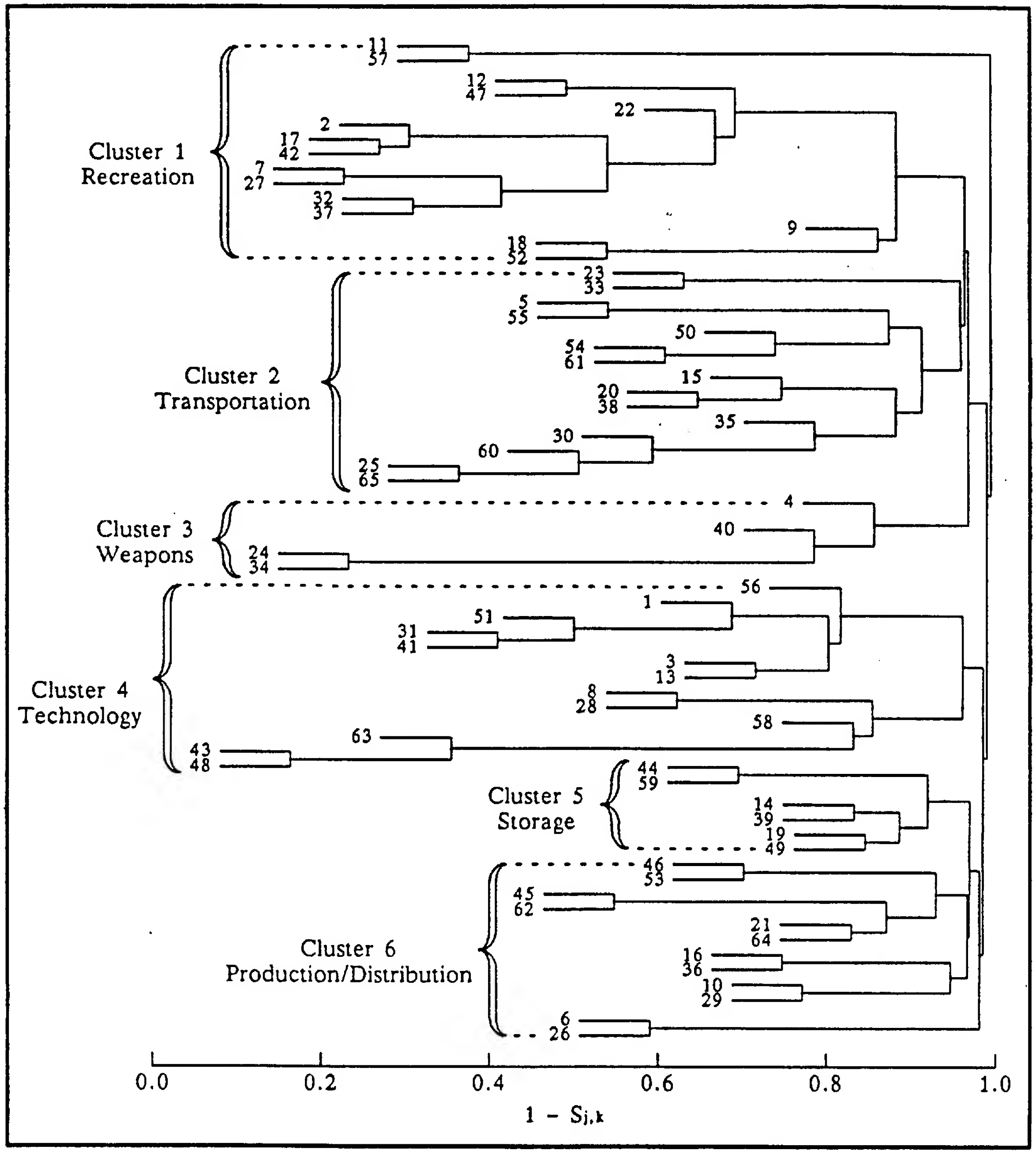

Figure 1. Cluster Diagram for Simulated Operational Targets

We used the technology cluster (i.e., number 4 in Figure 1) to apply Equation 4 to construct a technology target template. Table 2 shows the targets in this cluster, where the horizontal lines indicate the subclustering within the technology group shown in Figure 1.

Table 2

Technology Cluster

Target	Name
56.	Radio Towers
1.	Transformer Station
51.	Modern Windmills
31.	Electrical Plant
41.	Cogeneration Plant
3.	Satellite Dish
13.	Satellite Dishes
8.	Observatory
28.	Solar Observatory
58.	Pharmaceutical Laboratory
63.	Nuclear Accelerator
43.	Linear Accelerator
48.	Bevatron

Table 3 shows those elements that met or exceeded average membership values of 0.4 using Equation 4.

Table 3

Principal Elements Contained in the Technology Template

Levels	Number	Name
Affiliation	1	Commercial/Private
Function	14	Research/Experimentation
Attribute	24	Energy
Modifier	47	Electricity/Radio
Objects	88	High Technology Electronics
	99	Restricted Access
	120	Wires/Cables
Abstract	122	Activity—Passive
	130	Ambiance—Indoor
	131	Ambiance—Manmade
	137	Ambiance—Outdoor
	149	Size—Medium

As a self-consistency check, we included the technology template in the total target pool and recalculated the clusters. As expected, the technology template was included within the subgroup of targets 3 and 13, and well within the technology cluster as a whole.

D. General Conclusions

The goal of this effort was to develop an analysis system that would prove effective in providing a priori assessments of remote viewing tasks. If the proper mission-dependent universal set of elements can be identified, then, using a viewer-dependent reliability archive, data from a single remote viewing can be used to prioritize a set of alternative target templates so as to chose the most likely one for the mission.

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Appendix A

UNIVERSAL SET OF ELEMENTS FOR ANALYSIS OF FUNCTION

REMOTE PERCEPTION EVALUATION FORM

Experiment: ______
Trial: ______
Response: ______
Coder ID: ______
Viewer ID: ______
Target: ______
Date: ______

Affiliation

☐ 1 Commercial/Private	☐ 2 Government	☐ 3 Military

Function

☐ 4 Agriculture	☐ 9 Preservation	☐ 14 Research/Experimentation
☐ 5 Cleaning/Purification	☐ 10 Production	☐ 15 Storage
☐ 6 Distribution	☐ 11 Reception	☐ 16 Transmission
☐ 7 Education	☐ 12 Recreation/Aesthetic	☐ 17 Transportation
☐ 8 Extraction	☐ 13 Refining	

Attributes

☐ 18 Animals	☐ 25 Food	☐ 32 Plants
☐ 19 Astronomy	☐ 26 Historical	☐ 33 Space Exploration
☐ 20 Biology	☐ 27 Merchandise/Products	☐ 34 Vehicles
☐ 21 Chemistry	☐ 28 Minerals	☐ 35 Waste
☐ 22 Containers	☐ 29 Nature/Natural	☐ 36 Water/Ice
☐ 23 Ecology	☐ 30 People	☐ 37 Weapons
☐ 24 Energy	☐ 31 Physics	

REMOTE PERCEPTION EVALUATION FORM

Experiment: ______
Trial: ______
Response: ______
Coder ID: ______
Viewer ID: ______
Target: ______
Date: ______

Modifiers

☐ 38 Aircraft (Fixed-wing)	☐ 50 Grain	☐ 62 Salt /Sugar
☐ 39 Aircraft (Rotary-wing)	☐ 51 Guns	☐ 63 Ships/Boats
☐ 40 Ammunition	☐ 52 Livestock	☐ 64 Space Vehicles
☐ 41 Automobiles	☐ 53 Marine Life	☐ 65 Spectators
☐ 42 Barrels/Drums	☐ 54 Meat	☐ 66 Symbiotic
☐ 43 Bombs	☐ 55 Nuclear	☐ 67 Torpedos
☐ 44 Boxes	☐ 56 Paint	☐ 68 Toxic
☐ 45 Children	☐ 57 Participant	☐ 69 Trains
☐ 46 Convicts	☐ 58 Particle	☐ 70 Trucks
☐ 47 Electricity/Radio	☐ 59 Pharmaceuticals	☐ 71 Vegetables/Fruits
☐ 49 Explosives	☐ 60 Radioactive	☐ 72 Waste (Liquid)
☐ 48 Flammable	☐ 61 Rocks	☐ 73 Waste (Solid)

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REMOTE PERCEPTION EVALUATION FORM

Experiment: ______
Trial: ______
Response: ______
Coder ID: ______
Viewer ID: ______
Target: ______
Date: ______

Objects—Specific: I

☐	74	Accelerator	☐	82	Fans/Propellers	☐	90	Island
☐	75	Alarm	☐	83	Fence/Wall/Barrier	☐	91	Magnets
☐	76	Bridge (auto or foot)	☐	84	Forklift	☐	92	Monument
☐	77	Catwalk	☐	85	Fountain	☐	93	Pier/Jetty/Loading Dock
☐	78	Conveyer Belt	☐	86	Guard (security personnel)	☐	94	Pipes/Valves/Gauges
☐	79	Coastline	☐	87	Heat Generation	☐	95	Port/Harbor
☐	80	Crane	☐	88	High-Technology Electronics	☐	96	Raised Land—Cliff
☐	81	Dam	☐	89	Hydraulics	☐	97	Raised Land—Hills/Mountains

REMOTE PERCEPTION EVALUATION FORM

Experiment: ____________
Trial: ____________
Response: ____________
Coder ID: ____________
Viewer ID: ____________
Target: ____________
Date: ____________

Objects—Specific: II

- ☐ 98 Raised Land—Single Peak
- ☐ 99 Restricted Access
- ☐ 100 Satellite Dish
- ☐ 101 Shielding
- ☐ 102 Smoke Stack
- ☐ 103 Buildings—Group
- ☐ 104 Building—Isolated/Single
- ☐ 105 Buildings—Void of
- ☐ 106 Tank/Silo/Cylinder
- ☐ 107 Telescope
- ☐ 108 Tower
- ☐ 109 Tunnel/Cave/Underground
- ☐ 110 Turbine
- ☐ 111 Vacuum
- ☐ 112 Vegetation—Agricultural
- ☐ 113 Vegetation—Manicured
- ☐ 114 Vegetation—Natural
- ☐ 115 Voltage Transformer
- ☐ 116 Water—Bounded
- ☐ 117 Water—Canal
- ☐ 118 Water—Large Expanse
- ☐ 119 Water—River
- ☐ 120 Wires/Cables

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REMOTE PERCEPTION EVALUATION FORM

Experiment: ______
Trial: ______
Response: ______
Coder ID: ______
Viewer ID: ______
Target: ______
Date: ______

General/Abstract Items

- [ ] 121 Activity—Active
- [ ] 122 Activity—Passive
- [ ] 123 Activity—Flowing (water, air, etc.)
- [ ] 124 Activity—Other
- [ ] 125 Ambience—Abandoned
- [ ] 126 Ambience—Claustrophobic
- [ ] 127 Ambience—Congested
- [ ] 128 Ambience—Dangerous
- [ ] 129 Ambience—Disordered
- [ ] 130 Ambience—Indoor
- [ ] 131 Ambience—Manmade
- [ ] 132 Ambience—Natural
- [ ] 133 Ambience—Noisy
- [ ] 134 Ambience—Odoriferous
- [ ] 135 Ambience—Open/Expansive
- [ ] 136 Ambience—Ordered
- [ ] 137 Ambience—Outdoor
- [ ] 138 Ambience—Serene
- [ ] 139 Cloudy/Misty/Foggy
- [ ] 140 Colorful
- [ ] 141 Modern
- [ ] 142 Odd/Surprising
- [ ] 143 Old
- [ ] 144 Personnel-Few
- [ ] 145 Personnel—Many
- [ ] 146 Personnel—None
- [ ] 147 Single Predominant Feature
- [ ] 148 Size—Large (Univ. Campus)
- [ ] 149 Size—Medium (building)
- [ ] 150 Size—Small (human)
- [ ] 151 Dull—Colorless

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REMOTE PERCEPTION EVALUATION FORM

Experiment: ______
Trial: ______
Response: ______
Coder ID: ______
Viewer ID: ______
Target: ______
Date: ______

Additional Response Items

Function

- [ ] 152 ______
- [ ] 153 ______
- [ ] 154 ______
- [ ] 155 ______
- [ ] 156 ______

Attributes

- [ ] 157 ______
- [ ] 158 ______
- [ ] 159 ______
- [ ] 161 ______
- [ ] 160 ______
- [ ] 162 ______
- [ ] 163 ______

Modifiers

- [ ] 164 ______
- [ ] 165 ______
- [ ] 166 ______
- [ ] 167 ______
- [ ] 168 ______
- [ ] 169 ______
- [ ] 170 ______
- [ ] 171 ______
- [ ] 173 ______
- [ ] 172 ______
- [ ] 174 ______
- [ ] 175 ______
- [ ] 176 ______

Objects/Abstract

- [ ] 177 ______
- [ ] 178 ______
- [ ] 179 ______
- [ ] 180 ______
- [ ] 181 ______
- [ ] 182 ______
- [ ] 183 ______
- [ ] 185 ______
- [ ] 184 ______
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- [ ] 188 ______
- [ ] 189 ______

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Appendix B

ANALYSTS' GUIDE TO THE UNIVERSAL SET OF ELEMENTS FOR FUNCTION

AN ANALYST'S GUIDE TO THE UNIVERSAL SET OF ELEMENTS (U)

A. Introduction

This appendix is intended to assist an analyst in using the universal set of elements shown in Appendix A. We developed six levels of elements ranging from relatively abstract (information poor) to the relatively complex (information rich).

B. Element Levels and Their Use

The task of the analyst is to assign a membership value between 0 and 1 to each individual element. For targets, a numerical value will be assigned on the basis of the presence or absence of each element in terms of functional importance. For responses, the numerical value will be assigned on the basis of the degree to which the analyst is convinced that the element is contained in the response.

All subsequent commentary is referenced by the element numbers in Appendix A. Although each level may contain a number of elements, only those individual elements that may need explanation are listed below.

1. Element Level—Affiliation

"Affiliation" represents an advanced level of remote viewing functioning. Although we infrequently observe this advanced functioning, the data are valuable, and, therefore, are included. Elements in this level can be assigned membership values by asking the question, "Who owns the target?" There are only three "affiliation" elements:

(1) Commercial/Private.

(2) Government: Federal, state, or local governmental ownership (e.g., municipal utilities), but excluding military.

(3) Military: military ownership as separate from the above governmental ownership (e.g., a Navy submarine).

2. **Element Level—Function**

"Function" also represents an advanced level of remote viewing functioning, and it may represent the most important information with regard to overall function. Elements are assigned membership values by asking the question, "What is(are) the primary function(s) of the target?" There are 14 "function" elements, and a few require further explanation:

(6) Distribution: the primary function is to receive and to transmit something (e.g., an electrical transformer station).

(8) Extraction: as in the extraction of minerals from the ground.

(11) Reception: the primary function is only to receive (e.g., a satellite tracking station).

(13) Refining: the primary function is to refine a raw material into an intermediate or finished product (e.g., a saw mill).

(16) Transmission: the primary function is only to transmit (e.g., a radio tower).

3. **Element Level—Attributes**

"Attributes" can be thought of as clarification for the "function" level. Elements are assigned membership values by asking a question similar to, "If the function of the target is production, then what is being produced?" There are 20 "attribute" elements, and the following require further explanation:

(18) Animals: animals only.

(20) Biology: the study of living things in general.

(21) Chemistry: also includes chemicals.

(23) Ecology: symbiotic systems in nature, as in ecological zones (e.g., the Bay Lands Nature Preserve).

(24) Energy: energy in a broad sense that also includes radio waves.

(29) Nature/Natural: general natural objects (e.g., plants and animals).

(32) Plants: plants only.

(33) Space exploration: general, includes all experimentation done in space.

Elements 18 and 32 are given a membership value if the target/response is specifically oriented to one item. Otherwise element 29 should be assigned a value.

4. **Element Level—Modifiers**

"Modifiers" can be thought of as a clarification of the "attributes" level. Elements are assigned membership values by asking a question similar to, "If the function of the target is production, and vehicles are being produced, then what kind of vehicles are they?" There are 36 "modifiers" elements, and only element 66 requires further explanation:

(66) Symbiotic: symbiotic relationships not subsumed under natural or ecology (e.g., a cogeneration plant).

5. Element Level—Objects

"Objects" contains specific elements not necessarily related to function. Elements are assigned membership values on the basis of the presence or absence of each object in terms of functional importance. There are 47 "objects" elements, and the following require further explanation:

(77) Catwalk: elevated walkway.

(79) Coastline: used only as coastline of an ocean.

(88) High-Technology Electronics: silicon-based technology.

(95) Port/Harbor: port should be marked as in port of departure (e.g., airport, train station, seaport).

(116) Water-Bounded: only completely bounded bodies of water (e.g., pool or pond).

(117) Water-Canal: manmade.

(118) Water-Large Expanse: the San Francisco Bay should be marked as a large expanse.

(119) Water-River: also includes stream.

6. Element Level—General/Abstract Items

This level contains the most abstract elements. There are 31 elements, and the following require further explanation:

(121) Activity-Active: predominant visually active (e.g., an accelerator is very active electromagnetically, but would be considered passive, because there is little visual activity); potential activity is considered as passive.

(122) Activity-Passive: predominant visually passive (e.g., a ballpark is passive most of the time).

(123) Activity-Flowing (Water, Air, etc.): can be natural (e.g. creek) or manmade.

(128) Ambience-Dangerous: perceived and/or physically dangerous.

(140) Colorful: to be used only if especially characteristic.

(141) Modern: to be used only if especially characteristic.

(142) Odd/Surprising: to be used only if especially characteristic.

(143) Old: to be used only if especially characteristic.

(144) Personnel-Few: 1 to 10 employees mostly full-time.

(145) Personnel-Many: 10 to 1000 employees mostly full-time.

(146) Personnel-None: no full-time employees, but occasional human attention is allowed.

(148) Size-Large (University Campus): represents a "campus" size area.

(149) Size-Medium (Building): size of typical single buildings.

(150) Size-Small (Human): typically, the size of a human (i.e., 6 feet)

(151) Dull: to be used only if especially characteristic of the color.

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